Pitch angle diffusion of charged particles by finite amplitude MHD waves

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We discuss pitch angle diffusion of charged particles by finite amplitude MHD waves, by integrating in time ion trajectories under influence of static magnetic field turbulence, which is given as superposition of parallel Alfvén waves with equal propagation speeds (slab model). Although each wave mode is non-compressional, superposition of the waves yields ponderomotive compressional fields, which may mirror-reflect the ions. The wave phases are assumed to be random. When the turbulence energy is small, the particles stay within the hemisphere they belonged to initially. However, as the turbulence energy level is increased, substantial portion of particles start to traverse 90 degrees pitch. We propose a model to describe the pitch angle diffusion in a presence of finite amplitude MHD waves. Further we examine to which extent it is appropriate to describe the process in terms of classical diffusion, as opposed to the more general framework such as Levy process.

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